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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/688,169	10/18/2003	Anuj Batra	TI-35949	9531

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EXAMINER	
MUI, GARY	

ART UNIT	PAPER NUMBER
2416	

NOTIFICATION DATE	DELIVERY MODE
10/14/2008	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

uspto@ti.com

Office Action Summary	Application No.	Applicant(s)	
	10/688,169	BATRA ET AL.	
	Examiner	Art Unit	
	GARY MUI	2416	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on *15 July 2008*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-5 7-35* is/are rejected.

7)☒ Claim(s) *6* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Continued Examination Under 37 CFR 1.114

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on July 15, 2008 has been entered.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1 and 23 – 25 are rejected under 35 U.S.C. 102(e) as being anticipated by Li et al. (US 2002/0119781 A1; hereinafter "Li").

For claim 1, Li teaches a band of frequencies divided, into contiguous bands of tones (see paragraph 0023 and figure 1; entire frequency band is divided into clusters); a plurality of OFDM symbols, each OFDM symbol having a plurality of tones from a respective contiguous band (see paragraphs 0003 and 0023 and figure 2; OFDM symbols); and a data payload of the plurality of OFDM symbols interleaved in time and frequency (see paragraph 0023 and figure 2; clusters interleaved in time and frequency).

For claim 23, Li teaches the plurality of OFDM symbols are interleaved across a plurality of consecutive sub-bands (see paragraph 0023 and figure 2).

For claim 24, Li fails to teach the plurality of consecutive sub-bands is 3 and wherein the pattern of time-frequency interleaving across the consecutive sub-bands is [1 3 2 1 3 2 ...]. Howerver, this is a matter of design choice to place the number of bands and the pattern.

For claim 25, Li fails to explicitly teach each sub-band comprises a respective center frequency. But it is inherent of the sub-bands to have a center frequency. It is also noted that Li in figure 1 shows the cluster of sub-bands and show that there can be center frequencies.

Claim Rejections - 35 USC § 103

4. Claims 2 – 5 and 7 – 9 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of Forster et al. (US 2004/0047285 A1; hereinafter "Forster") and Tewfik et al. (US 2004/0005016 A1; hereinafter "Tewfik").

For claim 2, Li teaches all of the claimed invention expect to provide a wireless PAN having data payload communications capabilities of up to 480 Mb/s. Forster from the same field of endeavor teaches a UWB physical layer (see paragraph 0013, the sub-banded ultra-wideband and paragraph 0017, SB-UWB transmitter) but fails to teach that the wireless PAN having data payloads communication capabilities of up to 480 Mb/s. Tewfik et al. from the same field of endeavor teaches a high bit rate ultra-wideband the nodes exchange data at bit rates higher than 0.8 Gb/s with short latencies and the system is capable of achieving high bitrate rates on the order of 2 Gb/s (see paragraph 0017 and 0075). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use the

payload capabilities as taught by Tewfik and the SB-UWB communication system of Forster into Li. The motivation for doing this is that it will give end users more rate options.

For claim 3, Forester et al. teaches the UWB physical layer is configured to operate as a full-band system (see paragraph 0013, the UWB communication can transmit across all range of frequencies).

For claim 4, Forester teaches the UWB physical layer is further configured to generate a single OFDM signal solely form a contiguous subset of tones (see paragraph 0014).

For claim 5, Forester teaches the UWB physical layer is further configured to employ different subsets of tones for consecutive OFDM symbols (see paragraph 0014).

For claim 7, Forester teaches the UWB physical layer is further configured to generate a signal having a bandwidth greater than 500 MHz in response to 122 data tones (see paragraph 0013, generating impulses having a 500 MHz bandwidth).

For claim 8, Forester teaches the UWB physical layer is further configured to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones (see paragraph 0014)

For claim 9, Forester teaches the UWB physical layer is configured to operate as a sub-band system (see paragraph 0013).

Claim Rejections - 35 USC § 103

5. Claims 12, 13, and 27 – 30 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis (US 7,031,371 B1) in view of Ramasubramanian et al. (US 2003/0026360 A1; hereinafter "Ramasubramanian").

For claim 12, Lakkis teaches time domain data generated by an inverse fast Fourier transform (IFFT) of frequency domain data (see column 10 liens 54 - 59; time-frequency transformation). Lakkis fails to teach one of a cyclic prefix and a cyclic postfix; and a guard interval between the time domain data and said one of a cyclic prefix and a cyclic postfix comprising a plurality of zero samples. Ramasubramanian from the same field of endeavor teaches a guard interval is inserted between successive symbols to overcome inter-symbol interference (ISI) caused by multipath delay-spread in the communication channel. Usually each symbol is cyclically extended with a prefix and/or a postfix to cover the guard interval (see paragraph 0003). Therefore, it would have been obvious to one skilled in the art to have a prefix and/or postfix and a guard interval as taught by Ramasubramanian into Lakkis. The motivation for doing this is to provide a reliably system by overcoming inter-symbol interference.

For claim 13, Lakkis teaches a guard interval immediately following each OFDM symbol, and wherein the guard interval has a time period sufficient to allow the UWB transmitter to switch from one channel to another (see paragraph 0003).

For claim 27, it is inherit of the system the frequency domain data to be generated in the frequency domain.

For claim 28, Lakkis and Ramasubramanian fails to explicitly teach the frequency domain data is generated from time domain data by a discrete Fourier transform (DFT). However, Lakkis does teaches the use of and FFT to generate time data form frequency data (see column 12 line 54 – 65) and it would have been a matter of design choice to use DFT over FFT.

For claim 29, Lakkis and Ramasubramanian fails to explicitly teach the bandwidth of the OFDM signals is at least 500 MHz. However, it is a matter of design choice to use at least 500 MHz as the bandwidth.

For claim 30, Lakkis and Ramasubramanian fails to explicitly the IFFT produces the time domain data form 128 contiguous tones. However, it is a matter of design choice to use any number of tones to produce the time domain data.

Claim Rejections - 35 USC § 103

6. Claims 10 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Li, Forster, and Tewfik as applied to claim 9 above, and further in view of Ramasubramanian.

For claims 10 and 11, Li, Forster, and Tewfik teaches all of the claimed subject matter with the exception of each OFDM symbol comprise an output of an inverse fast four transform (IFFT) and one of a cyclic prefix and a cyclic postfix and to insert a guard interval immediately following each OFDM symbol. Ramasubramanian from the same field of endeavor teaches a guard interval is inserted between successive symbols to overcome inter-symbol interference (ISI) caused by multipath delay-spread in the communication channel. Usually each symbol is cyclically extended with a prefix and/or a postfix to cover the guard

interval (see paragraph 0003). Therefore, it would have been obvious to one skilled in the art to have a prefix and/or postfix and a guard interval as taught by Ramasubramanian into Lakkis. The motivation for doing this is to provide a reliably system by overcoming inter-symbol interference.

Claim Rejections - 35 USC § 103

7. Claims 14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis and Ramasubramanian as applied to claim 12 above, and further in view of Foerster.

Fro claim 14, Lakkis and Ramasubramanian teaches all of the claimed invention with the exception of a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN). Foerster form the same field of endeavor teaches a UWB receiver configured to receive TFI-OFDM signals, wherein the UWB transmitter and the UWB receiver together form a personal area network (PAN) (see paragraph 0017 and 0018, the SB-UWB receiver and SB-UWB transmitter combined to form the SB-UWB system). Therefore, it would have been obvious to one skilled in the art at the time of the invention to use the transmitter and receiver as taught by Foerster into Lakkis and Ramasubramanian. The motivation for doing this is to provide an efficient system by protecting the waveforms.

Claim Rejections - 35 USC § 103

8. Claims 15, 16, 18 – 22 are rejected under 35 U.S.C. 103(a) as being unpatentable over Foerster in view of Ramasubramanian.

For claim 15, Foerster teaches providing a UWB physical layer operational to generate OFDM symbols within a desired band and interleaving the OFDM symbols across both time and frequency to divide the desired band into smaller sub-bands (see paragraphs 0013 and 0014). Foerster et al. fails to teach inserting a guard interval comprising plural zero samples after each OFDM symbol, such that the UWB physical layer has sufficient time to switch from its current channel to the next channel. Ramasubramanian from the same field of endeavor teaches a guard interval is inserted between successive symbols to overcome inter-symbol interference (ISI) caused by multipath delay-spread in the communication channel. Usually each symbol is cyclically extended with a prefix and/or a postfix to cover the guard interval (see paragraph 0003). It is noted that it is well known in the art the guard intervals contain null symbols. Therefore, it would have been obvious to one skilled in the art to have a prefix and/or postfix and a guard interval as taught by Ramasubramanian into Lakkis. The motivation for doing this is to provide a reliably system by overcoming inter-symbol interference.

For claim 16, it is inherent of Foerster SB-UWB communication system that the desired band comprises the 3.1 – 10.6 GHz UWB band because this is the band that is regulated for UWB systems.

For claim 18, Forester teaches the UWB physical layer is further operational to generate a single OFDM signal solely form a contiguous subset of tones (see paragraph 0014).

For claim 19, Forester teaches the UWB physical layer is further operational to employ different subset of tones between consecutive OFDM symbols (see paragraph 0014).

For claim 20, Forester teaches the UWB physical layer is further operational to vary the subset of tones as a function of the time such that the UWB physical layer achieves the same transmit power as a full-band signal that occupies the complete bandwidth spanned by an inverse Fast Fourier Transform (see paragraph 0015).

For claim 21, Forester teaches the UWB physical layer is further operational to generate a signal having a bandwidth greater than 500 MHz in response to 122 tones (see paragraph 0013, generating impulses having a 500 MHz bandwidth).

For claim 22, Forester teaches the UWB physical layer is further operational to generate a single OFDM symbol solely from a contiguous subset of tones, wherein each subset contains 128 consecutive tones (see paragraph 0014).

Claim Rejections - 35 USC § 103

9. Claim 26 is rejected under 35 U.S.C. 103(a) as being unpatentable over Li in view of Forester.

For claim 26, Li teaches all of the claimed subject matter with the exception of the plurality of OFDM symbols are transmitted according to a power spectral density (PSD) mask having 0 dB relative to a maximum PSD of the signal at an offset of 260 MHz from a respective center frequency, -12 dB relative to the maximum PSD of the signal at an offset of 285 MHz, and -20 dB relative to the maximum PSD of the signal at an offset of 330 MHz. Forester from the same field of endeavor teaches the use of PSD environment and the PSD may be set by regulation (see paragraph 0023). It is also noted that the other parameter setting are a matter of design choice. Therefore, it would have been obvious to one of ordinary skill in the art at

the time of the invention was made to use PSD as taught by Forester into Li. The motivation for doing this is to increase the efficiency of the system to have the spectrum as flat as possible.

Claim Rejections - 35 USC § 103

10. Claims 31 – 33 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis and Ramasubramanian as applied to claim 12 above, and further in view of Halford et al. (US 2004/0032825 A1; hereinafter "Halford").

For claim 31, Lakkis and Ramasubramanian teaches all of the claimed subject matter with the exception of the frequency domain data comprises encoded information bits and pad bits. Halford from the same field of endeavor teaches that the packet payload includes packet user information or user data. The packet tail includes packet ending signaling, such as pad bits, flush bits, SIFs extensions, etc. (see paragraph 0005). Therefore, it would have been obvious to one skilled in the art to have information and pad bits in a packet as taught by Halford into Lakkis and Ramasubramanian. The motivation for doing this is to increase the efficiency of the system by minimizing the signal processing.

For claim 32, Lakkis, Ramasubramanian, and Halford fails to explicitly teach the information bits and pad bits are encoded using a R=1/3, K=7 convolution code. However, it is a matter of design choice to use any convolution code.

For claim 33, Lakkis, Ramasubramanian, and Halford fails to explicitly teach the encoded information bits and pad bits are punctured to generate various coding rates from R=11/32 to 3/4. However, it would have been a matter of design choice to create rates of any value.

Claim Rejections - 35 USC § 103

11. Claims 34 and 35 are rejected under 35 U.S.C. 103(a) as being unpatentable over Lakkis, Ramasubramanian, and Halford as applied to claim 32 above, and further in view of Li.

For claim 34, Lakkis, Ramasubramanian, and Halford fail to explicitly teach the encoded bits are interleaved, mapped onto symbols, and then onto tones. Li from the same field of endeavor teaches the use of OFDM through TDMA where the data is placed into clusters (see paragraphs 0003 and 0023 and figure 2). Therefore, it would have been obvious to one skilled in the art at the time of the invention to interleave and map the bits as taught by Li into Lakkis, Ramasubramanian, and Halford. The motivation for doing this is to provide an efficient system by mitigating the effects of intercell interference.

For claim 35, Li teaches tones include pilot tones that are randomized according to a cover sequence (see paragraph 0052). Therefore, it would have been obvious to one skilled in the art at the pilot tones as taught by Li into Lakkis, Ramasubramanian, and Halford. The motivation for doing this is to provide an efficient system by mitigating the effects of intercell interference.

Allowable Subject Matter

12. Claim 6 is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

13. **Examiner's Note**: Examiner has cited particular paragraphs or columns and line numbers in the references applied to the claims above for the convenience of the applicant. Although the specified citations are representative of the teachings of the art and are applied to specific limitations within the individual claim, other passages and figures may apply as well. It is respectfully requested from the applicant in preparing responses, to fully consider the references in entirety as potentially teaching all or part of the claimed invention, as well as the context of the passage as taught by the prior art or disclosed by the Examiner.

In the case of amending the claimed invention, Applicant is respectfully requested to indicate the portion(s) of the specification which dictate(s) the structure relied on for proper interpretation and also to verify and ascertain the metes and bounds of the claimed invention.

14. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gary Mui whose telephone number is (571) 270-1420. The examiner can normally be reached on Mon. - Thurs. 9 - 3 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ricky Ngo can be reached on (571) 272-3139. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR

system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Ricky Ngo/
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10/03/2008